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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/606,894	06/27/2003	Yukio Inazuki	0171-0983P	6145

2292 7590 05/15/2006

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EXAMINER

ROSASCO, STEPHEN D

ART UNIT PAPER NUMBER

1756

DATE MAILED: 05/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/606,894

Applicant(s)

INAZUKI ET AL.

Examiner

Stephen Rosasco

Art Unit

1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 February 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### Detailed Action

In response to the communication of 2/3/06, the examiner withdraws the previous office action rejections and includes new rejections here based on newly cited art.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over in view Kawada et al. (2002/0009653) in view of Konuma et al. (6,127,279) or Foster (6,387,804).

The claimed invention is directed to a method of manufacturing a phase shift mask blank comprising a transparent substrate and at least one layer of phase shift film thereon, said method comprising the steps of forming the phase shift film on the substrate and surface treating the phase shift film with ozone water having at least 1 ppm of ozone dissolved therein.

And wherein the phase shift film is a metal silicide oxide, metal silicide nitride or metal silicide oxynitride on the substrate and surface treating the phase shift film with ozone water having at least 1 ppm of ozone dissolved therein.

And wherein the metal is molybdenum.

The applicant also states that one important feature for these phase shift masks and phase shift mask blanks is resistance to acids, for example, chemical liquids such as

Art Unit: 1756

sulfuric acid and aqueous persulfuric acid (mixture of sulfuric acid and aqueous hydrogen peroxide) used in the resist removing and cleaning steps of the mask manufacture process, and chromium etchants having a high oxidizing power used in removal of chromium film.

[0012] Prior art phase shift films are less resistant to chemical liquids and raise a problem that the cleaning or chromium etching step results in deviations of phase difference and transmittance from the preset values.

Kawada et al. teach phase shift mask blanks comprising a phase shifter film made of a molybdenum silicide oxide nitride.

The teachings of Kawada et al. differ from those of the applicant in that the applicant teaches the method of surface treating of a phase shift mask with ozone water having at least 1 ppm of ozone dissolved therein.

Konuma et al. teach a method of manufacturing semiconductor device comprising the steps of: depositing a semiconductor film comprising amorphous silicon on an insulating surface of a substrate;

forming a conductive film on an insulating film on a substrate;

forming a patterned mask on said conductive film;

treating said patterned mask with water comprising ozone dissolved in a concentration from 0.1 to 20 ppm;

and then etching said conductive film into gate electrodes in accordance with said patterned mask using a liquid etchant.

Foster teaches (see claims) the use of an ozone/water treatment to passivate a silicon surface. In particular Foster teaches a method of manufacturing a semiconductor device, the method comprising: a gate electrode on a semiconductor substrate and sidewall

Art Unit: 1756

spacers on the opposing side surfaces; and contacting the sidewall spacers with a fluid comprising ozone and water for a period of time sufficient to passivate the sidewall spacers.

And herein the sidewall spacers comprise silicon nitride.

And wherein a concentration of the ozone in the water is about 25 to about 300 ppm.

Foster also teaches that the silicon bonds on the surface of the gate electrode and source/drain regions will also react with the ozone/water solution to form a thin oxide layer on their respective surfaces.

It would have been obvious to one having ordinary skill in the art to take the teachings of Kawada et al. who teaches the blanks and combine them with the teachings of Konuma et al. or Foster in order to make the claimed invention because Konuma et al. teach treating substrates with the claimed ozone water treatment and Foster in particular teaches the treatment for the passivation of silicide, and therefore it would be obvious to combine these teachings if one desired to passivate a silicide layer.

Applicant's arguments with respect to claims 1-15 have been considered but are moot in view of the new ground(s) of rejection.

Art Unit: 1756

*Conclusion*

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Stephen Rosasco whose telephone number is (571) 272-1389. The Examiner can normally be reached Monday-Friday, from 8:00 AM to 4:30 PM. The Examiner's supervisor, Mark Huff, can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'S. Rosasco', with a stylized, angular initial 'S'.

S. Rosasco  
Primary Examiner  
Art Unit 1756

S.Rosasco  
04/13/06